

CLAIMS

1 1. Method of operating a fuel igniter in an engine,
2 comprising:

3 a) generating a first plasma near a first end of a first
4 electrode;

5 b) maintaining a second electrode having a second end;

6 c) initially surrounding the second end with a solid
7 insulation; and

8 d) eroding the solid insulation, to expose the second
9 end, and then generating a second plasma between the
10 first and second electrodes.

1 2. Method according to claim 1, wherein the first plasma is
2 a cause of eroding the solid insulation.

1 3. Method according to claim 1, wherein the first plasma is
2 generated within a medium and the solid insulation has a higher
3 breakdown strength than the medium.

1 4. Method according to claim 1, wherein a current in the
2 second electrode accompanies the second plasma, and further
3 comprising:

4 e) detecting the current and issuing a signal in
5 response.

1 5. Method according to claim 4, and further comprising:
2 f) replacing the fuel igniter with a different fuel
3 igniter in response to the signal.

1 6. Method according to claim 5, and further comprising:
2 g) in the different fuel igniter,
3 i) generating a first plasma near a first end
4 of a first electrode;
5 ii) maintaining a second electrode having a
6 second end;
7 iii) initially maintaining a solid insulation
8 completely surrounding the second end; and
9 iv) eroding the solid insulation, to expose
10 the second end, and then generating a second
11 plasma between the first and second
12 electrodes.

1 7. Method according to claim 1, wherein the engine comprises
2 a gas turbine.

1 8. Method according to claim 6, wherein the engine comprises
2 a gas turbine.

1 9. An igniter for a gas turbine engine, comprising:
2 a) a first electrode having a tip;

3 b) a second electrode which cooperates with the tip to
4 generate a plasma; and
5 c) a third electrode having no exposure to the tip when
6 the igniter is newly installed, but which develops
7 exposure to the tip after a period of operation.

1 10. Igniter according to claim 9, and further comprising:

2 d) an insulator surrounding the first electrode.

1 11. Igniter according to claim 10, wherein the second
2 electrode surrounds the insulator.

1 12. Igniter according to claim 11, wherein the third
2 electrode is insulated from both the first and second electrodes.

1 13. Igniter according to claim 9, and further comprising a
2 sensor connected to the third electrode, for detecting current in
3 the third electrode.

1 14. An igniter for a gas turbine engine, comprising:

2 a) a first electrode having a tip;

3 b) an insulator surrounding the first electrode;

4 c) a second electrode surrounding the insulator, and
5 having an edge which cooperates with the tip to generate
6 a plasma; and

7 d) a third electrode embedded in the insulator, having

8 no part exposed to the first electrode.

1 15. Igniter according to claim 14, wherein operation of the
2 igniter causes part of the insulator to erode, thereby causing part
3 of the third electrode to become exposed to the tip.

1 16. Igniter according to claim 14, and further comprising a
2 sensor connected to the third electrode, for detecting current in
3 the third electrode.

1 17. Igniter according to claim 14, wherein the third
2 electrode comprises a cylinder, and surrounds the first electrode.

1 18. An igniter for a gas turbine engine, comprising:
2 a) a first electrode;
3 b) a second electrode which cooperates with the first
4 electrode to generate a plasma;
5 c) a third electrode;
6 d) a barrier between the third electrode and the first
7 electrode which
8 i) blocks auxiliary plasma formation between
9 the first and third electrodes at a time T1,
10 and
11 ii) erodes after T1, to enable said auxiliary
12 plasma formation.

1 19. An igniter for a gas turbine engine, comprising:
2 a) first and second electrodes which
3 i) cooperate to generate a plasma; and
4 ii) wherein plasma generation is accompanied
5 by a change which inhibits later plasma
6 generation; and
7 b) a third electrode which
8 i) becomes available with said change; and
9 ii) cooperates with either the first or
10 second electrode to generate a plasma.

1 20. An igniter for a gas turbine engine, comprising:
2 a) a first electrode;
3 b) a second electrode which cooperates with the first
4 electrode to generate a plasma; and
5 c) a third electrode which
6 i) is separated from the first electrode by
7 an erodible shield; and
8 ii) cooperates with the first electrode to
9 generate a plasma when sufficient erosion of
10 the shield occurs.

1 21. Igniter according to claim 20, wherein both the second
2 and third electrodes cooperate with the first electrode to generate
3 a plasma after predetermined erosion occurs.

1 22. An igniter for a gas turbine engine, comprising:
2 a) a first electrode, rod-like in configuration, coaxial
3 with an axis;
4 b) an insulator surrounding the first electrode, except
5 at a tip of the first electrode, where said tip is
6 exposed;
7 c) a second electrode, generally cylindrical in
8 configuration, coaxial with said axis, and surrounding
9 the insulator and the first electrode;
10 d) a third electrode having a distal end, embedded in
11 the insulator and completely surrounded by the insulator.

1 23. An igniter for a gas turbine engine, comprising:
2 a) a first electrode which changes in size during
3 operation; and
4 b) a marker which becomes visible when a predetermined
5 change in size occurs.